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Who Benefits and How Much?

How Gender Affects Welfare Impacts of a Booming Textile Industry

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Abstract

Exports of textile products originating from Sub-Saharan African countries have grown dramatically in the past decade. Recent trade initiatives, such as the "African Growth Opportunity Act" and "Everything but Arms," along with low labor costs and improved integration into world markets, are giving further stimulus to the growth of the textile and apparel industry in Sub-Saharan African countries.

Nicita and Razzaz explore the extent to which the poor are also beneficiaries of the export-led growth of particular economic sectors, or whether the poor are unable to reap any of the benefits and therefore fall further behind. They use a methodology that combines the matching methods literature (to identify individuals more likely to fill the new jobs of the expanding sector) with the industry wage premium literature (to quantify the gains of the individuals that move into the expanding sector).

The results indicate that a sustained export-driven growth in Madagascar's textile and apparel industry will lead to a substantial increase in the income of poor households, with a consequent decrease in poverty. In a scenario simulating five years of expansion of the textile sector, the authors estimate that more than one million individuals will directly or indirectly receive some benefit. On average, households in which one or more members work in the textile sector get an increase in purchasing power of about 24 percent or US$14 a month. The results further show that benefits are unevenly distributed across male and female workers. Households in which a male member is employed in the textile and apparel industry increase their purchasing power by 36 percent or US$24.5 a month, compared with 22 percent or US$12.2 a month in the case of a female worker.

This paper—a joint product of Trade, Development Research Group and the Gender Division, Poverty Reduction and Economic Management Network—is part of a larger effort in the Bank to study the linkages between trade and poverty. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Flewitt, room MC3-333, telephone 202-473-2724, fax 202-522-1159, email address pflewitt@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at anicita@worldbank.org or srazzaz@worldbank.org. April 2003. (42 pages)

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Introduction

Driven by a substantial comparative advantage, exports of labor intensive goods originating from developing countries have grown exponentially in the last decade. Likewise, exports could soon grow even more quickly for the least developed African countries because of the continuous relocation of firms seeking the most suitable locations, declining transport costs, improved economic and political conditions, and trading preferences given to the least developing countries (LDC) by international agreements such as the African Growth and Opportunity Act (AGOA)[1] and Everything But Arms (EBA).[2]

An ongoing concern for all countries experiencing labor intensive export led growth is how much of the benefit from this growth trickles down to workers and ultimately to household welfare. In other words, how much does export-led growth really help to reduce poverty. Even in the case that a substantial part of the benefits are reaped by a few entrepreneurs, employment in the fast growing exports sector may represent the best route out of poverty and economic vulnerability for a great number of individuals. In most cases, even if the earnings of workers in export sectors are very low by international standards, the alternative is often worse. As a large percentage population, even in urban areas, is still employed in marginal activities, the income offered by expanding export sectors is significantly higher, and the employment is usually more secure in terms of seasonality and job permanence. Furthermore, additional benefits previously unknown to most workers, such as healthcare and paid leave, are increasingly provided to workers in the export sectors. As a consequence, employment that may seem at the limit of tolerance by the standards of industrialized countries is envied and eagerly sought by an increasingly number of individuals in the least developed countries.

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[1] The African Growth and Opportunity Act was singed into American law as Title 1 of the U.S. Trade and Development Act on May 18, 2000.

[2] The "Everything But Arms" initiative was signed by the European Union Council of Ministers February 27, 2001. Furthermore, the elimination under the WTO agreement of quotas on textile and clothing represents an additional stimulus to relocate.

The purpose of this paper is to examine the extent to which comparative advantage-based growth helps raise household welfare, and to identify the mechanisms through which such growth is distributed to households. As a case study, this paper analyzes one of the sectors which has experienced the fastest growth in African countries, the textile and apparel industry. For this purpose Madagascar serves as an excellent example. Madagascar was on the verge of substantial growth in textile exports at the time the data for this study was collected.[3] While transaction costs in Madagascar are still not competitive with other developing countries, Madagascar's advantage is represented by salary costs that are about half of those of India or China and about one quarter of those of neighboring Mauritius. The recent growth of Madagascar's textile industry has been the result both of local entrepreneurial initiative and, most importantly, of the relocation of textile industries to Madagascar by Mauritius' investors attracted by the large wage differential. Therefore, driven by low salary costs, an improving economic environment and preferential access to world markets, it appears very plausible that some of the least developing Sub-Saharan countries such as Madagascar will likely become important textile and garment exporters in the near future.

The expansion of an economic sector improves the living conditions of households in two principal ways: the creation of new employment, and the wage differential between the expanding sector and the rest of the economy. Therefore, to be able to quantify the effect of new employment and wage increases, it is important to identify the individuals affected and their gains. To do so, this paper combines the matching methodology literature (to identify individuals more likely to move into the expanding sector) with the industry wage premium literature (to quantify the gains of the individuals that move into the expanding sector). The analysis also calculates expected gains to individuals already working in the expanding sector. In this paper sectoral growth and increase in employment are taken exogenously from historical trends and from the experiences of similar countries. Wage differentials and wage growth are estimates in the model. The

[3] Unfortunately, the recent political uncertainty in Madagascar led to a stalemate that only recently seems to have been resolved. This may have possibly pushed many already established industries to seek localization elsewhere. At the moment, it is too early to estimate the harm done by the political situation to the growth

methodology utilized is based on a partial equilibrium framework, with growth affecting only the expanding sector while the rest of the economy grows at a constant, lower, rate.[4]

Because individuals embed different characteristics, different groups are likely to experience different gains from the growth of export oriented sectors. In particular, education, age, location and gender are all important factors in determining who is likely to benefit from export-led growth and in what extent. An important aspect of the textile and apparel industry is the large number of women employed. As monetary income and higher wages attract them out of unpaid family work, informal activities and unemployment, women are given a unique opportunity to enter the labor force and improve their economic independence. Furthermore, the mobilization of the female labor force has been a key element in the process of economic development. From this point of view, the analysis will be conducted from a gender perspective, investigating the differences in the benefits reaped by women compared to those of men.

To briefly summarize the results, in a five-year scenario, assuming a growth of 20% per year, approximately 1 million individuals will have their purchasing power increased by about 24% as a direct consequence of the expansion of the textile sector, effectively leading approximately 158,000 individuals out of poverty. Monetary gains are very different between genders and between skilled and unskilled workers. On average, the gains of male workers are estimated to be about double of those of female workers. Especially for the unskilled female workers, which represent about 38% of the labor force in the textile and apparel sector, the monetary gains are small.

The paper is structured as follows: section 2 briefly illustrates the experience of Mauritius and describes the status of the textile industry in Madagascar, its possibilities, and the characteristics of its employees. Section 3 describes the data. Section 4 illustrates the methodology followed in estimating the income gains for workers and their households.

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potential in the textile industry in Madagascar. Nevertheless, the result of this paper may be interpreted as a missed opportunity.

[4] This assumption is consistent with the existence of an excess labor force and a scarcely interconnected economy typical of many of the least developing countries.

Section 5 presents and discusses the results. Finally, section 6 summarizes the main conclusions. An appendix discusses the evolution of the gender wage gap in the textiles and apparel industry.

2. Textile and apparel industry: Mauritius' experiences and Madagascar's potential.

During the past few decades a number of countries have experienced economic development from export growth. In many cases, the textile and apparel industry played a primary role in galvanizing the economy of countries previously reliant on agriculture or natural resource products. Mauritius is one of the most successful cases.[5]

Figure 1 shows the export performance of the textile and apparel industry in the last 25 years for Sub-Saharan Africa, Mauritius and Madagascar. Mauritius has been, by far, the major exporter of textile products. During the economic boom of the '80s and early '90s, the sector's output grew by 20 percent per year, its employment by 22 percent and its exports by 12 percent.[6] This success is reflected in the performance of the economy with GDP per capita almost tripling between 1980 and 2000.[7] The early growth of the Mauritian textile industry was characterized by increases in employment. At the beginning of the '90s, however, Mauritius faced labor supply shortages and upward pressure on wages, forcing Mauritian firms to economize on their use of inputs (especially labor) through the improvement of their efficiency and the relocation of the most labor intensive processes to neighboring countries. Therefore, the pattern of the development of the Mauritian textile industry seems to have followed two stages: a first stage in which excess labor supply prevents upward pressure on wages, especially for less skilled workers; then, a second stage in which labor shortages push wage cost upward and leed firms to economize on their use of inputs with improvement of their efficiency and relocation. Mauritius' success has been summarized into a few key elements: the creation and implementation of effective Export Processing Zones (EPZ), a sound set of

[5] Subramanian (2001)
[6] Employment in the textile and apparel industry grew from about 15,000 in the early '80s to almost 90,000 in the early '90s.
[7] From about 1500 USD to 4500 UDS.

trade and economic policies, a favorable climate that attracted foreign direct investments (FDI) and finally, generous preferential access to markets of major trading partners. Therefore it is possible that, with the right recipe of economic policies and an effective implementation of EPZs, the textile and apparel sector could produce similar effects for other countries in Sub-Saharan Africa.

Madagascar has only recently developed an export oriented textile industry. Figure 2 gives the values in USD of Madagascar's export of textiles and apparel between 1993 and 2000.

In 1993, the export of textile products was valued at about $71 million USD. This figure grew more than fivefold in 2000 to reach about $380 million USD. Exports to the U.S. market have experienced an even faster growth jumping from $22 million USD to more than $100 million USD between 1998 and 2000.[8] Sustained export growth has been a characteristic of the last 5 years of the decade, during which it achieved a steady increase of about 20% per year. Recent reliable production data is not available; nevertheless the industrial census reports that in 1995 about 60% of Madagascar's textile and apparel production was exported. Likely, this figure is now larger as many textile factories have been established recently in the Export Processing Zones (EPZ). In 1995, employment in the EPZs accounted for about two-thirds of total employment in the industry. Almost all of the textile industry was localized in the urban district of Antananarivo.[9]

Future development of the textile industry looks even brighter considering the impact of trade initiatives such as EBA and the AGOA. These initiatives allow products originating from the poorest developing countries to full duty and quota-free access to European Union markets (EBA) and the United States (AGOA).[10] Companies that are exempt from government-imposed taxes and have production facilities able to meet the quality

[8] More recent estimates indicate almost a doubling in Madagascar's exports of textiles to the United States between 2000 and 2001 (from $110,000 to $190,000) with a large portion of the exports ($80,000) classified under the AGOA agreement.
[9] Although, about one third of textile workers commute from the rural district of Antananarivo.

standards required by the international markets are the greatest beneficiaries of these initiatives. The AGOA act provides an average of a 17.5% duty advantage on apparel imports in the US market. The effect of the EBA are more difficult to quantify because textile products are already widely liberalized. Recent estimates suggest that following trade liberalization, the increase of textile and apparel exports from the least developed countries to Quad (Canada, European Union, Japan and the U.S.A.) would be an average of about 11%. (Hoekman, Ng and Olarreaga, 2001). Accounting for the relocalization of textile industries, Madagascar's recent historical export performance and its beneficiary status in the AGOA and EBA initiatives, it is likely that Malagasy exports could grab a large part the benefits from the increased market access in the industrialized countries.

The analysis of the 1999 household survey makes it possible to extract further information about the textile industry and, more importantly, analyze the characteristics and well being of its employees. Table 1 summarizes some basic findings, differentiated by gender.

In 1999, about 136,000 individuals reported employment in the textile sector.[11] Of those, about 75% were women. Considering a total population of about 15 million people, and an active workforce of slightly more than 8 million individuals, in 1999 the textile industry employed approximately 1.5% of the active workforce. Even with so few employees, the textile industry was already the fourth most important sector of employment after agriculture (74%), commerce (6%) and public administration (2.5%). Comparable data from industrial censuses and firm level surveys report about 42,000 jobs in the textile industry in 1995 indicating a sustained employment growth of slightly less than 30% per year.[12] The effect of the growth of the textile industry on social wealth goes

[10] The AGOA program started in October 2000 and is planned to last 8 years. Raw materials are required to be imported from the U.S. except for countries with per capita GDP of less than $1,500 USD per year, such as Madagascar, to which raw materials can be imported from any country during the first four years.
[11] Approximately 116,000 report textiles as their primary activity.
[12] Industriel census 1995 (RI95) and annual inquiry in Industry 1996 (EAI96). The 1995 industrial census also estimates the growth rate of the value of production for the year 1996 at 47.7% and the growth rate in employment at 28.6%. More recent estimates were collected by the Integrated Framework mission in 2001 using firm level interviews. According to those, the value of production and the labor force of existing firms is expected to grow in the order of 20% per year for the next 3 years.

beyond the increases in income and the greater stability of employment experienced by its workers. Other members of households in which one or more members work in the textile industry are indirectly affected as well. Therefore, in 1999 the performance of the industry was reflected in the well-being of about 460,000 individuals or 3% of the population. In addition, the sector provides externalities that spread to other sectors of the economy.

Figure 3 displays distribution of the labor force in the textile sector by age and education.[13] The age distribution of the workers indicates a fairly young labor force, with female workers being younger than their male counterparts. The textile industry clearly employs fairly skilled people since the majority of workers has more than nine years of education, compared to an average of 4.2 years in the labor force in the district of Antananarivo. Men tend to have a significantly higher education than women. There are virtually no male workers with fewer than 4 years of education and no female workers with more than 16 years of education. Table 1 also demonstrates the types of contracts employees hold. In this case, the differentiation by gender is striking. About 79 % of the men employed in the industry report having a permanent salaried position, while in the case of women, this figure is about 57%. In addition, about 17% of women (versus 3% of men) hold temporary jobs. Independent workers, including subcontracted individuals, make up about 18% of men and 26% of women employed in the textile sector.

Figure 4 displays the distribution of the wages in the textile sector. The median wage in the industry is about $31 USD per month. There is a large difference between the genders: the percentile distribution for men is constantly higher than the one for woman by about $20 USD. The median wage for men is about $47 USD per month, while for women this figure was about $28 USD. Figure 3 also reports the average monthly wage by age and years of education, differentiated by gender. According to the data, especially for lower level of education, men tend to have a higher wage than women. Only for well educated workers, those with more than 11 years of education, are wages similar. Unfortunately, as seen in figure 3, less than 20% of female workers have more than 11

[13] The figures are constructed using locally weighed smoothed averages.

years of education. The distribution by age suggests the hypothesis of different career paths for men and women. While wages for men increase with age, wages for women peak between 30 and 40 years of age. This can be explained by the importance of manual productivity for the earnings of a significant share of the female labor force. Finally, the survey questionnaire asked if the respondent's current salary has increased or decreased in the last year. Almost 40% of the individuals reported an increase in the wage while about 10% reported a decrease. The remaining 50% of the individuals either were not employed in the previous year or their salary did not change.

The comparison of the 1997 and 1999 household surveys suggests how wages have evolved between 1997 and 1999. Figure 5 reports the lower 80% of the distribution of the real wages in the textile sector in 1997 and 1999.

Because of a volatile exchange rate, it is more appropriate to use values in Malagasy Francs (FMG) in the comparison of the wages in 1997 and 1999. Median wages in 1997 were about 150,000FMG (200,000 for men and 135,000 for women), while in 1999 this figure was about 200,000 (300,000 for men and 176,000 for women). This indicates an average increase of about 33% at the median or a real increase of about 9% per year, considering inflation. Wages increased most among workers at the bottom of the wage distribution.

Poverty continues to affect a large part of the Malagasy population. Poverty trends in the '90s have been, if anything, worsening.[14] In 1999 about three quarters of the population lived below the poverty line with peaks of more than 80% in rural areas and an "oasis" of 40% in the urban areas. Households with members employed in the textile sectors reported expenditures slightly higher than the average urban household living in Antananarivo.[15] In 1999 about 39% of households for which one or more members were employed in the textile sector reported expenditures below the poverty line. (See Table

[14] See: Razafindravonona, Stifel and Paternostro (2001).
[15] Considering that one third of the textile workers reside in the rural district of Antananarivo, where poverty levels are substantially worse, textile workers appear to be well above the average in term of total expenditures.

1.) Differentiating by gender, about 25% of the households in which men and 44% of the household which women are employed in the textile sector lived in poverty.

3. Data

The analysis relies primarily on data from the 1999 *Enquete Prioritaire Aupres des Menages* (EPM).[16] The household-level data used for the analysis were collected by the Direction des Statistiques des Ménages (DSM) of the Institut National de la Statistique (INSTAT) in Madagascar. The surveys are stratified, multi-staged and clustered. The 1999 survey was collected from September to November 1999 and reports data for 5,120 households and 25,656 individuals, which are representative of the entire population. The surveys are designed to be representative at the regional level (*faritany*) as well as the urban/rural level within each region. The surveys include income, consumption, the households' characteristics and the individuals' characteristics. Following the standard practice in the literature, the total expenditure is used as a proxy for income to calculate poverty indicators. Because the welfare measures are concerned with the well being of individuals, all expenditures were converted to a per capita basis.[17]

4. Empirical Strategy

To estimate the impact of the growth in employment and the increase in the wages we follow the approach of Nicita (2002) which combines the matching methodology literature (Heckman, Ichimura and Todd 1997) with the industry wage premium of the labor literature (Krueger and Summers, 1988; Helwege, 1992; Haisken-DeNew and Schmidt, 1997). The estimation consists of two stages. First, propensity scores to identify the individuals more likely to change their jobs to the textile industry are estimated. Then an estimate of each individual wage premium associated with the change in employment

[16] The analysis also makes use of the 1997 EPM for the estimation of the increase in wage between 1997 and 1999. The construction of the 1997 survey is similar to that of 1999. Nevertheless, some comparability problems forced us to restrict the estimation using only variables that could be considered consistent between the two surveys.

[17] To obtain per capita measures, this paper adopts the standard practice of dividing household income and expenditures by its residents, with children of age 14 or less counting as half of adults.

sector is calculated. As an additional step, a further estimation is performed to obtain the wage growth rates. This methodology therefore identifies the expected increase in income of the workers in the textile industry as well as the exact individuals that will likely become part of the textile and garment industry and their expected income. Finally, the predicted increase in income is distributed across the members of the household to obtain estimates of poverty levels and social indicators.[18]

The labor force is divided into four sectors of employment: the informal sector, the service sector, the textiles sector, and other industries.[19] The informal sector can be thought of as a reserve labor sector and is composed of agriculture, small commerce and other marginal sectors identified as informal in the data.[20] The selection process is achieved by estimating propensity scores, i.e. the predicted probability that each individual has of being selected based on his observed characteristics.[21] The propensity scores are obtained from the estimation of a logit model.[22]

$$L_i = \beta_0 + \beta_1 X_i + \beta_2 H_i + \varepsilon_i \qquad (1)$$

Where L_i is the logit of a dichotomous variable that takes the value 1 if the *i* individual is employed in the textile sector and 0 otherwise. X_i is a vector of individual characteristics and H_i is a vector of household characteristics. Expansion in the textile sector will imply drawing resources, including labor, to this sector. The center of our analysis is its impact on the labor market. Each person is assigned a score indicating their propensity to become employed in the textile sector. The probability of moving into the textile sector is

[18] The paper adopts the assumption that the intra-household allocation of income is equal between the genders. This is the classical assumption which treats households as monolithic entities. Attempts to investigate the different patterns of intra-household allocation of income and consumption have been done, but the theoretical framework is still controversial and very constrained by the data requirement. For example see: Bourguignon and Chiappori (1992), Davies and Joshi (1994) and Deaton (1997).
[19] The lack of sufficient observation for several sectors does not allow a more disaggregated differentiation.
[20] It also includes unemployed individuals. For these, the imputed wage (lower than the reservation wage) is assumed to be in line with the other workers of the informal sectors.
[21] The estimation ranks the individuals according to their propensity to be employed in the textile and apparel sector based on the characteristics of the individuals already employed in the same sector.
[22] Robust estimates are obtained using first-order Taylor-series linearization methods. Standard errors are corrected for survey design following Binder (1983).

a function of a series of demographic characteristics. These include gender, age, level of education, head of household status, marital status, regional location, number of members in the household, other family members working in the textile sector, and secondary employment.[23] The individuals are then ranked according to the estimated probabilities. Those with highest rank, move into the textile sector if such a move results in a higher wage for them. [24]

As mentioned above, wages in the textile sector are significantly higher than in the informal sectors.[25] Because not all individuals report wages, there is the need first to impute a predicted wage to all the individuals for which the actual wage is not observed.[26] Then the estimation produces the expected wage that every individual is likely to receive if employed in the textile industry. The wage differential is therefore calculated as the difference between the observed or predicted wage in the informal sector and the predicted wage in the textile sector.[27] The estimation regresses the log of worker *i*'s wages ($\ln W_{ij}$) on a vector of worker *i*'s characteristics (X_{ij}) and a set of industry indicators (I_{ij}) and takes the Mincerian form:

$$\ln W_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 I_{ij} + \varepsilon_{ij} \qquad (2)$$

The specification is estimated using both the standard OLS corrected for survey design and the Heckman two-step procedure.[28] Workers' characteristics include gender, age,

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[23] Regional variables are justified by the fact that migration flows are still very small and recruitment is likely to be done by "word of mouth" and mostly locally.

[24] Therefore, if their reservation wage is higher than the ones expected in the textile sector, they will not change sector. Those individuals whose actual wages are not directly observed and whose expenditures are twice the poverty line are also not allowed to move. This tends to correct for unobserved workers' characteristics that are in part manifested in their expenditures.

[25] The informal sector is defined to include non-commercial agriculture, small commerce and other sectors categorized as informal or marginal in the household survey.

[26] This is done by estimating the wage equation (2) for each of the four sector of the economy. To impute reservation wages for workers whose earnings are not observed, such as intra-household workers and the formally unemployed, we assume that their wage can be equated to the wages of similar individuals employed in the informal sector.

[27] To correct for different kinds of employment (temporary and permanent) wages are converted to daily basis.

[28] The Heckman selection model, (Heckman, 1979) corrects for the fact that personal reservation wages are not observed. In the common cases, individuals who would have low wages may be unlikely to choose to work. Therefore, without correction, the obtained estimated may be upward biased. In our case the

education attained, head of household status, number of household members, marital status, and formality of employment. To control for location specific effects two dummy variables are used: a urban/rural dummy and a dummy for urban Antananarivo where the cost of living is substantially higher. The coefficient on the industry dummy captures the wage premium of the textile and garment industries, i.e. the part of the variation in wages that cannot be explained by worker characteristics, but can be explained by the workers' industry affiliation.[29] The coefficient on gender gives the differential effect by gender.[30] The coefficients on the education variable report the skill premium (i.e. the return to schooling).

In predicting wage growth for textile workers, this paper assumes future wage growth will be identical to the wage growth observed between 1997 and 1999. To allow for variations in wage growth across categories of workers the estimates are obtained by pooling the cross-sectional data of 1997 and 1999 together. The estimation is highly constrained by the scarcity of a wider time series and by the difference in the construction of some of the variables between the two surveys.[31] The estimation takes the form:

$$\ln W_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 T_{it} + \beta_3 X_{it} T_{it} + \varepsilon_{it} \qquad (3)$$

Where $\ln W_{it}$ is the log of the wage of the individual i in time t, X_{it} is a vector of individual characteristics which include gender, skilled/unskilled and age. T_t is a time dummy that takes value 1 for 1999. Therefore, the coefficient on the time dummy captures the wage differential between 1997 and 1999 for unskilled females workers, while the interaction terms, $X_{it}T_{it}$, capture the time differential effect for males and for skilled workers.[32] The results from the econometric estimates are used in the simulation

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estimations using OLS and Heckman produced very similar results. In the results, we report the OLS estimates.

[29] The omitted industry (agriculture and informal sector) has a zero wage premium.

[30] More precisely, because of the log-linear form, the differential effect for dummy variables is given by: $(e^{\beta} - 1)$.

[31] Furthermore, some concern about misreported values in the 1997 surveys and a fat-tailed distribution of the independent variable led us to estimate the equation using quantile regression at the median.

[32] A further interaction term, age/year, turn out to be statistically insignificant.

exercise. Having identified the individuals who are more likely to move into the textile industry and having estimated their specific wage differential, therefore it is possible to calculate the impact on individual and household income. The impact on the real income of individual i at time t is given by:

$$\Delta Income_{it} = Income_{i0}\left[(1 + \Delta Dw_i)(1 + W_t)^t - 1\right]R_i \qquad (4)$$

where ΔDw_i is the wage differential for individual i estimated by equation (2), W_t is the increase in the wage for the individual i between 1997 and 1999 estimated by equation (3) and R_i is a dichotomous variable taking the value one for the individuals employed in the textile sector or for the individuals with the best matching characteristics estimated according to equation (1) and zero otherwise.

The new level of income is then utilized to quantify the effect of the expansion of the textile and apparel sector on household income and on poverty levels. As previously mentioned, the exercise is done in partial equilibrium. Therefore, in the other sectors the wages are set to increase at the overall rate of the economy.

5. Results

5.1 Wages

Table 2 reports the results of the estimation of the propensity scores. In particular, age, education, and the presence of another family worker employed in the textile industry are strong positive determinants of the selective process. Being male decreases the individual's likelihood of being employed in textiles. The simulation exercises assume that employment in the textile and apparel sector increases at a rate 20% per year.[33] Therefore, to simulate the five-year scenario, the first 171,000 individuals ranked according to results of equation (1) are selected and their sector of employment is set to

[33] This number quite conservatively reflects the industry's historical growth rate in Madagascar of about 27% between 1995 and 1999.

textiles. (If their current wage is higher than their predicted wage in textiles, they do not move into textiles.)

Table 3 reports the results of the estimation of the wage equation. All the variables of interest are significant and have the correct sign. In particular, age, education and urban areas have all positive signs and are significant at the 5% level or better. Being male also increases the individual's expected wage. The textile industry dummy reports the wage premium for the textile sector. A coefficient of 0.468 corresponds to about a 60% in wage premium with respect to the informal sectors. The coefficient for gender reports a 25% premium for male workers across the economy as a whole. The coefficient on education calculated across all industries indicates a 7% increase in wage per additional year of education. The lack of significance of the interaction dummy between gender and the textile industry indicates that the level of wage discrimination faced by women in the textile sector is similar to that in other sectors.

Table 4 presents the results of the pooled regression. Consistent with the descriptive analysis above, the regression results report an average increase in the real wage. The regression results indicate, however, that this average increase was not distributed evenly across workers. Skilled male workers (18% of employees) received an increase of 34% per year between 1997 and 1999, while skilled female workers (38% of employees) received an increase of 23%. Unskilled male workers (7% of employees) received an increase of 11%, while unskilled women (37% of employees) received no increase.[34] Jobs held by women therefore experience a much lower wage growth than those held by men. This reflects the fact that women hold the majority of temporary jobs, which have a high turnover and for which there is no upward pressure on the wages.

5.2 Characteristics of new entrants in the textile and apparel industry

The net effect on income of any movement of the labor force across economic sectors is strictly dependent on how and where this labor force was formerly employed. Table 5

[34] These values are calculated from the coefficient of the interaction dummies. Skilled individuals are characterized by 9 or more years of education or a specific apprenticeship for the textile sector.

briefly illustrates former employment and some of the characteristics of the entrant workers in the textile industry.

The five year simulation assumes about 171,000 new jobs in the textile industry. Only 14% of individuals were previously employed in a formal job, 34% were employed in informal and precarious positions, while about 52% were unemployed or employed within the household. Individuals were also categorized by their former sector of employment. About 20% of the new entrants were employed in agriculture, 23% were employed in the informal sectors, about 45% were categorized as unemployed or as unpaid family workers, with the remaining 12% reporting services or industry as their sector of employment. Differences are present between the genders. Almost half of female new entrants (versus 28% of male) were unpaid family workers or formally unemployed and a much lower percentage of female new entrants is drawn from the service sectors and other industries (12%, versus 25% of male new entrants).

About 75% of individuals had not received any benefits, such as pension, paid leave and healthcare, in their previous jobs. Per capita consumption of new entrants are on average about $52 USD per month. Compared with textile workers, for whom monthly consumption is currently about $68 USD, their expenditure is about 24% lower. About 44% of the new entrants are currently living below the poverty line.

Table 5 also reports individual characteristics of the new entrants the textile industry. By design, the characteristics of new entrants are similar to those of current textile workers. Most of the new jobs are filled by people under the age of 35 years. Women are mostly concentrated within the 26-35 age group (42% of women). Of those selected, about 75% are considered unskilled workers. Finally, table 5 also reports the marital status and the family position of the new entrants. Of the female workers more likely to become employed in the textile sectors 60% are married, 58%are spouse of the household head and 65% live in the district of urban Antananarivo. About 10% of the new entrant female workers are head of the household themselves. Male new entrants are mostly not married

(63%), are head of the household (44%) and live in the rural district of Antananarivo (62%).

Examining the characteristics of the new entrants in the textile sector evidences that textile jobs usually offer an improvement over previous employment, as many of the new entrants are drawn from unemployment, unpaid family work and from marginal sectors. Furthermore, textile jobs offer benefits such as healthcare, paid leave and pension, that previously were rarely available for these workers. Textile jobs offer a good opportunity especially for women, as most of them were employed only marginally outside the household and mostly occupied in the overall household income.

5.3 Household and individual welfare

Results from the econometric estimates are used to forecast the impact on poverty and household well being. Table 6 reports indicators of how the new jobs and the wage increases in the textile sector affect individual income, and how this increased income affects household expenditures and finally on social indicators.

The results report an average increase in monthly income of about $65 real USD.[35] In percentage terms this is equivalent to an increase of more than 200%.[36] Wage increases are very different between the genders. Male workers earn on average $115 USD more per month, while the earnings of female workers increase by about $56 USD. Workers' gains are transmitted to households' expenditures. Assuming a uniform distribution of the individuals' gains to their respective households, the increase in income allows an increase in household expenditures of about 27%.[37] From household gains it is possible to calculate the household members' per capita gains. Household members obtain an average increase in purchasing power of about 24% or $14 USD per month. As before, the differences in the increase in income are substantial depending on the gender of the

[35] As a clarification, this is the increase in income exclusively owed to the employment in the textile sector. It should be interpreted as the average difference of the increase in income between an individual employed in the textile sector and a similar individual in the rest of the economy.

[36] This percentage increase is calculated also including individuals that moved into the textile sector and for which the previous wage was much lower.

textile worker. Individuals in which a male household member is employed in the textile and apparel industry can increase their expenditure by 36% or $24.5 USD per month, versus 22% or $12.2USD per month in the case of a female worker.

Table 6 also reports some social indicators. In a five year scenario, approximately one million individuals are affected by the growth in the textile industry either directly (because employment) or indirectly (because their households include textile workers). Differentiating by the gender of the workers, about 963,000 individuals, living in household where there is female textile worker have their expenditure increased by at least $12.20 USD per month.[38] The gains are at least $24.50 USD per month in the case of the approximately 200,000 individuals that live in households that include male workers in the textile and apparel industry. Each worker affects the welfare of about 4.2 individuals. Households of new entrants are larger (on average, new workers support 4.5 individuals) than those of existing textile workers (3.8 individuals). From a poverty perspective, as a consequence of the increase in income and its distribution within the households, 158,282 individuals experience an increase of income sufficient to lift them out of poverty. About 123,000 of those come from household which were not employing any member in the textile and apparel industry. This translates into 0.7 individual being lifted out of poverty for every new job created in the textile sector. Differentiating by gender, each new male worker lift out of poverty about 2.4 individuals. Meanwhile, each new female worker lifts about 0.5 individuals out of poverty in the course of five years.[39] The effects of the growth of the textile sector are much wider if we consider the total number of people that report an increase in income as a consequence of the expansion of the textile sector. Even if for most of them the increase in income is not sufficient to lift them out of poverty, it surely represents a large improvement in their means of living. From this point of view, each new job in the textile sectors increase the purchasing power of approximately 4 individuals by about 24%.

[37] Gains in purchasing power are higher in households where a man is employed or finds employment in the textile sector (41%) than in the case of a woman (19%).
[38] This value is higher if more members of the same household are emplyed in the textile industry.

The data can be used to calculate a few more indicators that show how workers benefit in addition to the increase in their income. For a household, the availability of monetary income is important since it allows a wider range of consumption choices. In the case of households in which one or more family member have found employment in the textile industry, the share of monetary income increases from 59% to 81%. For women, this is of particular importance. In the case of households in which one or more female members are employed in the textile sector, the women' share of the households' monetary income rises from 8% to 33%. For those households, cash income directly supplied by women in many cases surpasses the cash income directly supplied by men.[40] Considering the fact that 85% of the women that find new employment in the textile sector have never directly received any monetary income in past employment (compared to 15% of new male entrants), the availability of new cash income for those households is a substantial result. The availability of monetary income lets households afford services previously inaccessible, such as child education or healthcare and a much wider range of consumer goods.

6. Concluding Remarks

This study found that the textile and apparel industry in Madagascar gives viable means for a large mass of individuals and households to increase income and ultimately to help them in escaping poverty. The textile industry's capability to improve households' living conditions is due to two main factors: the creation of employment and the increase in wages. Employment in the textile industry has been growing at a rate of more than 25% per year in the last five years. Second, the textile industry has an average earning premium of $15 USD per month, or about 60% of the average income of the workers in the informal and non-commercial agriculture sectors. Wages, especially for skilled workers, have increased dramatically between 1997 and 1999 and, given their still low levels, are likely to continue to grow. Moreover, in many cases, the textile industry offers

[39] In the case of households which employ more than one member in the textile sector the number of individuals affected is weighted by the change in income of each workers.
[40] Because not all the income of the households can be univocally attributed to one gender, about 50% of the income is attributed to the household as a whole and therefore taken out of the calculation.

employment benefits such as healthcare, pensions, paid leave and a less precarious form of employment, all of which are important in raising the living standards of workers and their households. Finally, the textile industry helps to increase the monetary part of income, allowing a much wider range in the households' expenditure choice.

From a gender perspective, the analysis found that female workers benefit substantially less than male workers. This is due mainly to different skills, employment position, and ultimately discrimination. The gender wage gap in the textile industry is substantial, as male workers receive a 30% wage premium compared to equally skilled female workers. This is most likely the result of the sharp division of labor by gender, with men occupying more remunerative positions and women holding most of the temporary jobs. On average, jobs held by men have a paycheck almost 50% larger than those held by women. The gender wage gap has risen between 1997 and 1999 and it may rise even further in the next few years, since it appears that men have different career paths than women, and employment positions that require skilled workers, for which wages increase more, are mostly filled by men. The results revealed that textile jobs that require less skilled workforce are unlikely to experience any significant increase in real wages. This is particularly unfortunate for the 40% of the industry's workers that are unskilled women. Upward pressure on unskilled wages is unlikely to occur as long as we see a large reserve unskilled labor force and a continued high turnover in textile jobs. Nevertheless, the textile industry probably offers the best opportunity for women to enter the labor market, to obtain economic independence and to actively contribute to economic development.

Without taking into account inevitable positive spillovers to other sectors of the economy, the results indicate that in a five-year period, a sustained growth of the textile sector of 20% per year will have a substantial effect on the welfare of the households. Considering the total number of individuals that are affected directly, through employment, or indirectly, as members of households where one or more relatives have found a position in the textile industry, more than 1 million individuals will be able to afford an increase of approximately 24% in their expenditure. Even if for many of them

this increase is not sufficient to be lifted over the poverty line, it surely represents a substantial improvement. The results shows that, on average, for each new job in the textile industry, 4.5 individuals have their purchasing power increased, and for 0.7 this increase is sufficient to be lifted out of poverty. Finally, benefits are unevenly distributed across male and female workers. Female workers, on average, receive, and distribute to their household members, only approximately half of the gains collected by male workers.

References:

Davies, H. and Joshi, H. (1994), "Sex, sharing and the distribution of income", *Journal of Social Policy*, 23, 301–40.

Bourguignon F. and Chiappori P. (1992), "Collective Models of Household Behavior: an introduction", *European Economic Review*, 36:355-64

Deaton, Angus (1997), "The analysis of household surveys : a microeconometric approach to development policy", Johns Hopkins University Press. Baltimore.

Haisken-De-New, J.P and C.M. Schmidt (1997), "Inter-Industry and Inter-region Wage Differentials: Mechanics and Interpretation", *Review of Economics and Statistics*; 79, pp 516-521.

Heckman J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica*; 47:153-161.

Heckman, J., Ichimura, H. and P. Todd, (1998), "Matching as an Econometric Evaluation Estimator". *Review of Economic Studies (U.K.)*; 65, pp. 261-94.

Helwege, J. (1992), "Sectoral Shift and the Interindustry Wage Differentials" *Journal of Labor economics*; 10, pp. 55-84.

Hoekman B., F. Ng and M. Olarreaga (2001) "Eliminating excessive tariffs on exports of least developed countries" *Policy research Working Papers series* No. 2604, May 2001; World Bank.

Krueger, A.B. and L.H. Summers (1988), "Efficiency Wages and the Inter-Industry Wage Structure". *Econometrica*; 56, pp. 259-293.

MADIO Project (1996) "The industrial formal sector in Madagascar : Characteristics Performance, Prospects". Annual inquiry in Industry in action 1996 - First result 1997.

McCulloch N., A. Winters and J. Cicera (2001), "Trade Liberalization and Poverty: A Handbook".CEPR.

Nicita, A., M. Olarreaga and I. Soloaga (2001), "A methodology to assess policy impacts on poverty", World Bank DECRG-International Trade, mimeo.

Nicita, Alessandro (2002) "How, and how much households benefit from comparative advantage export-led growth", World Bank DECRG-International Trade, mimeo.

Oaxaca Ronald L. (1973), "Male-Female Wage Differentials in Urban Labor Markets", *International Economic Review*; 14 (3), pp. 693-709.

Oaxaca R.L, and M. R. Ransom (1994), "On discrimination and the decomposition of wage differentials", *Journal of Econometrics* ; 61, pp. 5-21

Razafindravonona, Jean, David Stifel, and Stefano Paternostro, (2001), "Evolution de la pauvrete' a Madagascar: 1993-1999". Anatanarivo: INSTAT. Reprinted in: "Changes in Poverty in Madagascar: 1993-1999."*Africa Region Working Paper Series* No. 19, July 2001; World Bank.

Subramanian Arvind (2001), "Mauritius: a case study" *Finance and Development* IMF 38, No. 4:22-25, December 2001

Appendix: The Gender Wage Gap

In 1999 male workers in the textile industry received a wage about 50% higher than female workers. Given this large gross wage differential this appendix investigates the extent to which the gender wage gap in the textile and apparel industry can be attributed to differences in endowments or other unobservable factors such as discrimination, career paths and job turnover. In doing so, this paper utilizes the methods widely used by the labor literature developed by Oaxaca (1973) and by Oaxaca and Ransom (1994). Briefly summarizing, the methodology is based on two separate estimation of a Mincer type earning equation for male and female workers. In absence of discrimination, and correcting for differences in skills, the earnings are identical for both groups. That is, the part of the wage differential that can be explained by discrimination is captured by the difference in the predicted values of the explanatory variables for the two groups of males workers and females workers. Finally, to correct for sample selection bias a Heckman model of the earning probability is used.

For each group of workers the estimation takes the form:

$$Ln(w)_i = \beta_i X_i + u_i$$

where $Ln(w)$ is the natural logarithms of monthly wages, X_i is a vector of individual characteristics, β_i is a vector of OLS estimated coefficients and u_i is a random disturbance term and i is the sub index for the individual. Introducing subscripts m and f for the two groups, the wage differences between males and females workers can be expressed and decomposed in:

$$\text{Ln}(\tilde{w})_m - \text{Ln}(\tilde{w})_f = \hat{\beta}_m \overline{X}_m - \hat{\beta}_f \overline{X}_f$$

The difference between the coefficient of the two groups is:

$$\Delta \hat{\beta} = \hat{\beta}_m - \hat{\beta}_f$$

In the absence of discrimination the male wages can be applied to the female workers. Therefore,

$$\text{Ln}(\tilde{w})_m - \text{Ln}(\tilde{w})_f = \hat{\beta}_m(\overline{X}_m - \overline{X}_f) + \overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$$

where, $\text{Ln}(\tilde{w})$ is the logarithm of the geometric mean of wages, $\overline{X}$ are the vectors of the arithmetic means of the regressors and $\hat{\beta}$ and are the vectors of the estimated coefficients. The term $\hat{\beta}_m(\overline{X}_m - \overline{X}_f)$ represents the part of the wage differential that stems from differences in productivity.[41] The term $\overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$ is the difference dues in the parameters of the wage function, caused by potential labor market discrimination and other omitted factors. To correct for systematic differences between individuals that have reported positive wages and those that do not work because their reservation wage is higher than their market wage, Heckman's (1979) two-stage estimation will be used. Therefore, in presence of selectivity, the wage differences between males and females workers can be written as:

$$\text{Ln}(\tilde{w})_m - \text{Ln}(\tilde{w})_f = \left(\hat{\beta}_m \overline{X}_m + \hat{\phi}_m \bar{\lambda}_m\right) - \left(\hat{\beta}_f \overline{X}_f + \hat{\phi}_f \bar{\lambda}_f\right) =$$

$$\hat{\beta}_m(\overline{X}_m - \overline{X}_f) + \overline{X}_f(\hat{\beta}_m - \hat{\beta}_f) + \left(\hat{\phi}_m \bar{\lambda}_m - \hat{\phi}_f \bar{\lambda}_f\right)$$

where $\hat{\phi}$ is the estimate of the correlation in the error term in the probit and the wage equation and $\bar{\lambda}$ is the mean of the inverse Mill's ratios. The term: $\hat{\phi}_m \bar{\lambda}_m - \hat{\phi}_f \bar{\lambda}_f$ captures the wage differential due to selectivity.[42]

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[41] Productivity is assumed positively correlated with level of education and potential work experience.

[42] Selectivity bias can be attributed to a different reservation wage or difference in wage offers for the two groups. If the reservation wage for female workers is lower, then they will tend to have a higher participation rate then men with similar endowments, thus increasing the observed wage differential. In the

In our specification, the determinants of the market wage are level of education, potential work experience and a regional dummy for urban district of Antananarivo.[43] The variables that determine the reservation wages in the probit estimation are augmented with three more variables: number of children, civil status and status of household head. Those are aimed in capturing the costs of entering the labor force for the individuals in the two groups.[44]

Table A1 summarizes the findings in the wage differential decomposition for the year 1999 and 1997.

In 1999 the gross unadjusted wage differential is about 51% in favor of males. The results of the decomposition attribute about 14% of it to differences in endowments. The unexplained part accounts for about 59% of the wage differential, while the remnant 27% is due to selectivity. Those results suggest that, although there are differences in the level of education and experience across genders, these characteristics explain only a small part of the wage differential. Possible explanations of the large unexplained difference in the wages are likely to be found in the different career paths, job opportunities and turnover rates that the textile sector offers to men compared to women, all of which may or may not be a direct effect of discriminatory practices.[45] What the results show is that for two individuals of opposite sex, a male worker has a wage on average 30% higher than a similarly educated and experienced female worker.

Three main facts can be derived from the earning difference decomposition. First, both the endowments as well as the unexplained part of the wage difference favor male

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case that the wage offer for female is lower (as in the case of discrimination) and reservation wages are equal for both groups, fewer women will participate in the wage labor force and this would narrow the gap in observed wages. Therefore, the selectivity bias cannot be univocally attributed to discriminatory practices.

[43] Following standard practice in the case that work experience is not directly observable from the data, the variable potential work experience is constructed as: age – years of formal (and compulsory) schooling - 6.

[44] We report the results of the earning function with Heckman correction in table A2.

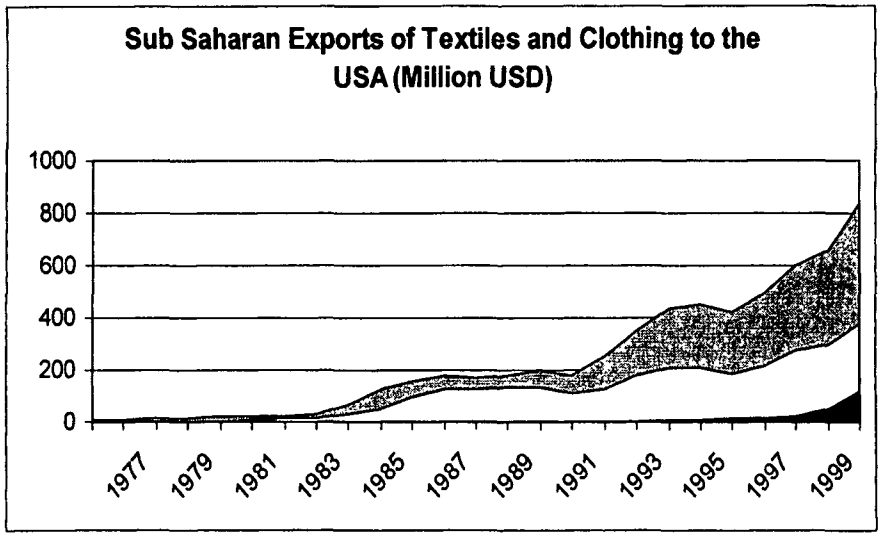
[45] Furthermore, other un-observable characteristics, such as family relationships between employers and employees or unobservable skills may have an impact on wages.

workers, although the latter dominates the former. Second, education and experience (measured by age) are similarly important in determining the wage differential. Third, level of education and being resident in urban Antananarivo slightly reduce the unexplained part of the wage differential.[46]

The comparison of the 1997 and the 1999 data shows the gross unadjusted wage differential has grown from about 30% to about 50%. The results in the decomposition shows similar patterns in 1997 and 1999. As in 1999, in the 1997 decomposition, not considering the effect of selectivity, discrimination and other omitted factors account for most of the wage differential, but in 1997 they are slightly more important in explaining the wage differential (69% versus 59% in 1999). Also the adjusted wage differential grew over time, as in 1997 it was granting a 21% premium to male workers versus female workers with similar endowments (versus 30% of 1999). Given the larger selectivity bias in 1999 the results do not allow to conclude that discrimination has declined between 1997 and 1999. Indeed, considering that selectivity bias was substantially lower in 1997, suggesting a more similar reservation wage for the two groups or a less discriminatory practice in the wage offer, there is little evidence of large differences between 1997 and 1999 in the jobs structure or discriminatory practices in the textile industry.

[46] If we consider the all unexplained part of the wage differential as discrimination and given the sign of the coefficients, the third point implies women with higher education are less discriminated. Similarly, potential experience (measured as age) affect positively the discrimination part of the wage differential suggesting that older women, ceteris paribus, are subject to more discrimination.

Figure 1
Sub-Saharan Textile and Apparel Exports (Million USD)



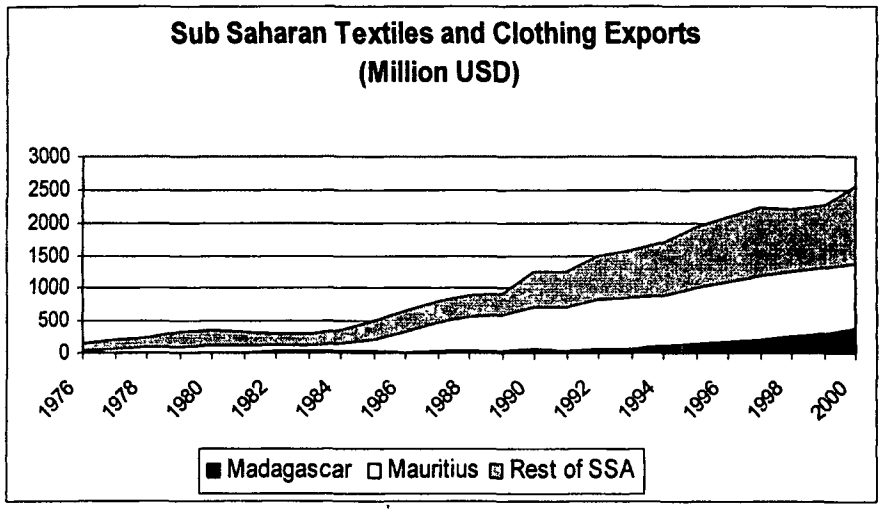
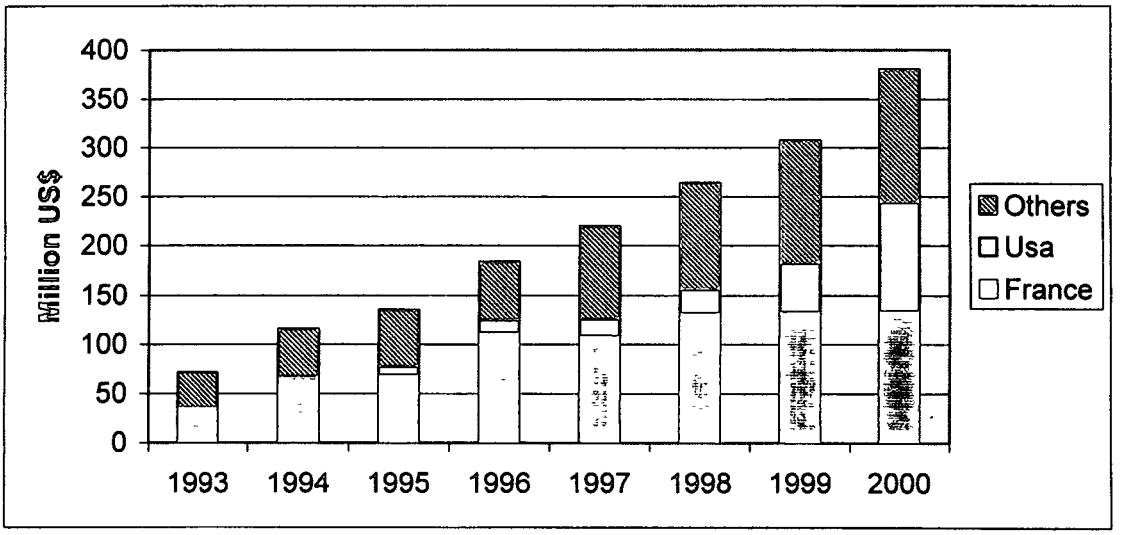
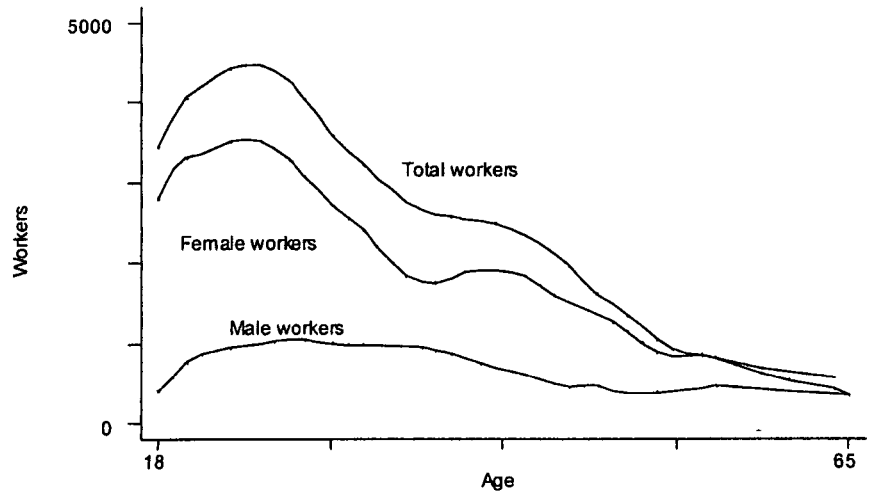


Figure 2
Madagascar's Textile and Apparel Exports (1993-2000)

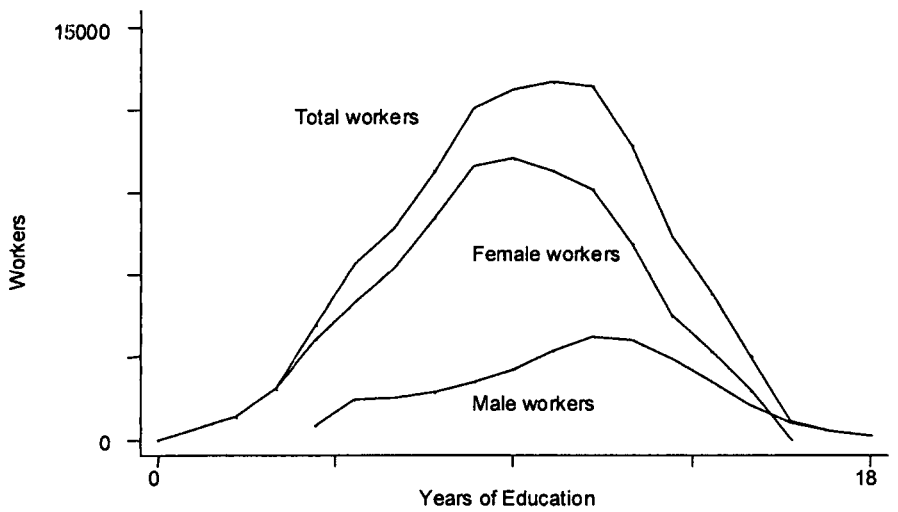


Source · Comtrade data

Figure 3
Age and Educational Level of Textile Workers (1999)



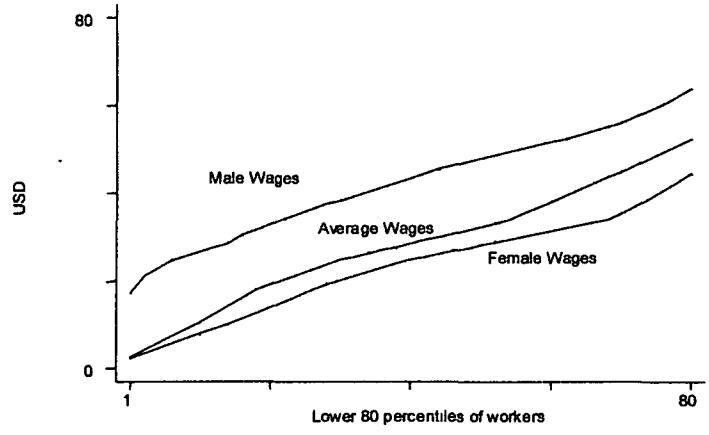
Workers by Age

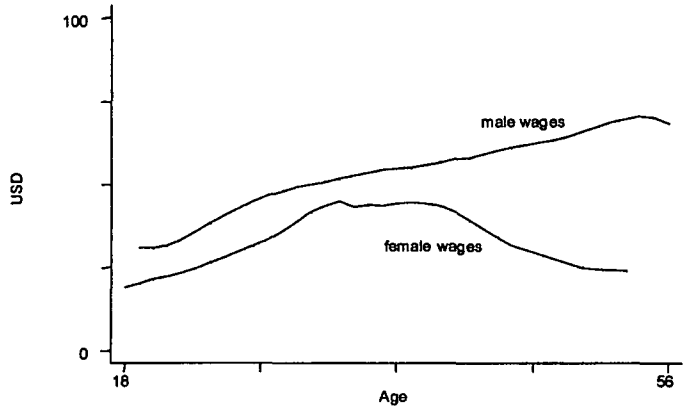


Workers by Years of Education

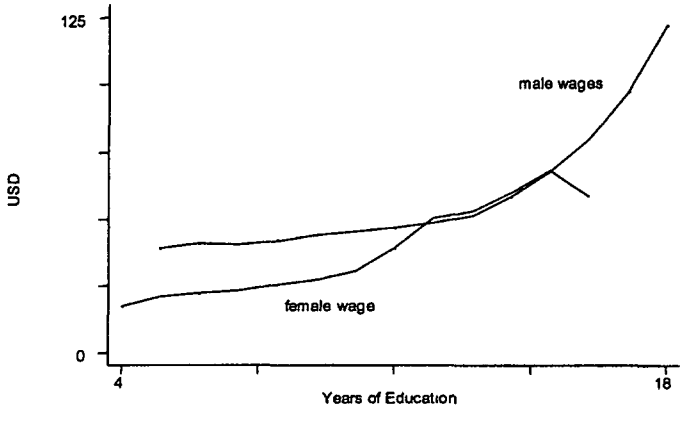
Source Authors' calculation using Household and Expenditure Survey 1999

Figure 4
Wages' Distribution in the Textile and Apparel Sector (1999)





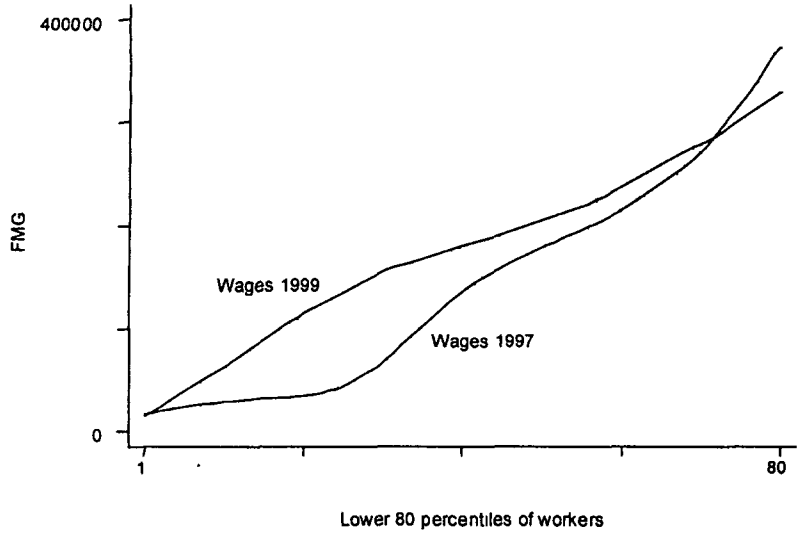
Average Monthly Wage by Age (USD)



AVG Monthly Wage by Education (USD)

Source Authors' calculation using Household and Expenditure Survey 1999

Figure 5
Distribution of Real Wages in the Textile and Apparel sector 1997 and 1999 (FMG).



Source Authors' calculation using Household and Expenditure Survey 1997-1999

Table 1
Workers' Characteristics in the Textile and Apparel Industry in Madagascar (1999)

Employment Indicators	Total	Male	Female
Number of employees	135,875	24.8%	75.2%
Permanent Positions	84,931	78.9%	57.1%
Temporary Positions	17,770	2.4%	16.6%
Subcontracted Individuals	33,174	18.7%	26.3%
Skilled/Unskilled			
Unskilled Workers	46.1%	29.9%	51.8%
Skilled Workers	54.9%	70.1%	48.2%
Benefits (% of workers)			
None (or doesn't know)	52.5%	75.3%	43.2%
Some	17.3%	14.6%	18.4%
All (pension, healthcare, paid leave)	30.2%	10.1%	38.4%
Income Indicators			
Monthly Wages (USD)			
Mean Wage	$38.6	$49.9	$33.9
Median Wage	$31.3	$46.9	$27.5
25 Percentile	$23.4	$35.9	$13.5
75 Percentile	$46.9	$54.9	$39.1
Poverty			
% workers below the poverty line	39.1%	25.2%	43.8%
Monthly per capita expenditure	$68.2	$80.5	$64.1
Individual Characteristics			
Age group			
15-17	2.5%	0.4%	3.2%
18-25	29.4%	27.3%	30.1%
26-35	30.4%	27.5%	31.3%
36-45	24.5%	26.0%	24.0%
46-55	8.3%	10.5%	7.6%
56-65	2.5%	4.1%	2.0%
66-99	2.5%	4.4%	1.9%
Marital Status			
Married	53.7%	65.6%	49.1%
Not Married	35.6%	25.4%	39.0%
Divorced/Widow	10.7%	9.0%	11.9%
Family Position			
Household Head	23.0%	63.3%	9.6%
Spouse of HH	32.6%	1.0%	43.1%
Other family member	44.4%	35.7%	47.3%
Region of Residence			
Urban Antananarivo	57.8%	69.8%	53.8%
Rural Antananarivo	32.8%	25.1%	35.4%
Other Regions	9.4%	5.1%	10.8%

Table 2
Propensity Scores Estimation

Variable	*Coefficient*	*T-Statistic*
gender	-2.717***	(3.18)
age	0.149***	(2.94)
age2	-0.002***	(3.27)
gen_age	0.031	(1.39)
educ	0.812***	(5.93)
educ2	-0.035***	(5.14)
gen_edu	-0.069	(0.15)
familypos	0.204	(0.57)
married	-0.488*	(1.87)
region1	-8.036***	(9.13)
region2	-11.600***	(8.88)
region3	-10.007***	(10.31)
region4	-11.510***	(11.54)
region5	-10.856***	(8.85)
region6	-10.455***	(10.99)
urban/rural	1.003***	(4.88)
othertextile	3.967***	(14.50)
sec_income	-0.124	(0.45)
hhmembers	-0.164***	(3.47)
Number of observations	19524	
Population size	10992194	
Adjusted R squared	0.241	

Note: Absolute values of t-statistics are shown in brackets.
Significance levels of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Variables Definition:
logitflag = logit (1 if textile workers) (dependent)
gender=1 if male
age = age in years (age2 = age squared)
gen_age = interaction dummy gender/age
educ= years of education (educ2 = educ squared)
gen_edu = interaction dummy gender/educ
familypos =1 if household head
married =1 if married
region = regional dummy
urban/rural =1 if urban
othertextile =1 if other household member are employed in the textile sector
sec_income =1 if worker has a secondary income
hh members = number of individuals living in the household

Table 3
Wage Equation Results

Variable	*Coefficient*	*T-Statistic*
gender	0.217***	(3.55)
age	0.057***	(4.72)
age2	-0.001***	(3.83)
hhmembers	0.001	(0.00)
married	0.229***	(3.96)
urban/rural	0.239***	(5.22)
educ	0.068***	(3.58)
educ2	0.001	(0.56)
industryind	0.648***	(7.26)
industryser	0.340***	(4.05)
industrytex	0.468***	(4.17)
industrytexf	-0.098	(0.74)
salarytype	0.104*	(1.76)
Antananarivo	-0.061	(1.42)
hheaddummy	-0.008	(0.14)
hheadgender	-0.080	(1.01)
constant	9.629***	(38.70)
Number of observations	1996	
Population size	875929	
Adjusted R squared	0.507	

Note: Absolute values of t-statistics are shown in brackets.
Significance levels of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Variables Definition:

logwage= ln(wage) (dependent)
gender =1 if male
age = age in years (age2 = age squared)
educ= years of education (educ2 = educ squared)
hh members = number of individuals living in the household
married =1 if married
urban/rural =1 if urban
industry() = industry dummies
industrytexf = interaction dummy textile industry / gender
salarytype =1 if salary or employment is categorized as permanent (=0 if temporary)
Antananarivo =1 if regional code is urban Antananarivo
hheaddummy =1 if worker is the household head
hheadgender =1 if the households head is male

Table 4
Pooled Regression Results

Variable	*Coefficient*	*T-Statistic*
age	0.010***	(3.17)
year	-0.163	(1.37)
skill	-0.149	(1.52)
gender	0.093	(1.38)
gender_year	0.207**	(2.07)
skill_year	0.372***	(2.98)
constant	11.838***	(81.03)
Number of observations	285	
Population size	161677	
Adjusted R squared	0.076	

Note: Absolute values of t-statistics are shown in brackets.
Significance levels of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Variables Definition:
logwage= ln(wage) (dependent)
age = age in years
year =1 if 1999
skill =1 if skilled worker
gender =1 if male
gender_year = interaction dummy gender/year
skill_year = interaction dummy skill/year

Table 5
Characteristics of the Entrants the Textile and Apparel Industry

Employment Indicators	Total	Male	Female
Total New Jobs			
Number of Individuals moving	170,702	18,777	151,925
Former type of employment			
Permanent	14%	48%	12%
Temporary	34%	31%	24%
HH employed or Unemployed	52%	21%	64%
Former sector of employment			
Agriculture	20%	21%	19%
Informal sector	23%	26%	22%
Services	10%	18%	11%
Other Industries	2%	7%	1%
Not indicated or Unemployed	45%	28%	47%
Benefits in previous employment			
No benefits	74%	47%	78%
Some benefits	26%	53%	22%
Income Indicators			
Average monthly per capita expenditure			
Expenditure (USD)	$52.20	$46.30	$52.90
Poverty			
Headcount index	44%	64%	42%
Individual Characteristics			
Age Group			
15-17	5%	10%	4%
18-25	24%	39%	23%
26-35	39%	15%	42%
36-45	22%	22%	22%
46-55	8%	11%	8%
56-65	2%	3%	1%
Skilled/Unskilled			
Unskilled workers	71%	73%	71%
Skilled workers	29%	27%	29%
Marital Status			
Married	58%	33%	61%
Not Married	29%	63%	25%
Divorced/Widow	10%	4%	14%
Family Position			
Household Head	13%	44%	10%
Spouse of HH	52%	0%	58%
Other family member	35%	56%	32%
Region of Residence			
Urban Antananarivo	65%	38%	68%
Rural Antananarivo	34%	62%	31%
Other Regions	1%	0%	1%

Table 6
Simulation Results: Welfare

Income Indicators of Workers		***Male***	***Female***
Average Increase In Monthly Income (USD)			
$65.5		$114.7	$56.3
Average Monthly Income (USD)			
$97.3		$154.9	$85.8
Average Percentage Increase in Income after 5 years			
212%		276%	190%
Expenditures Indicators of Households			
Monthly per capita Household expenditure (USD)			
$291.7		$350.9	$277.1
Percentage increase in Households Expenditures			
26.56%		40.98%	23.02%
Monthly per capita gains of each household member (USD)			
$14.2		$24.5	$12.2
Monthly per capita gains as a % of pc expenditure			
24.29%		35.99%	21.81%
Social Indicators			
Number of individuals directly or indirectly affected (for each category of workers)			
from all workers			
1,020,318	number of individuals	200,203	963,476
4.2	number of individuals per worker	4.1	4.2
from workers already in the textile and apparel industry			
461,445	number of individuals	147,886	362,206
3.8	number of individuals per worker	4.4	3.5
from workers not already in the textile and apparel industry			
713,177	number of individuals	67,454	691,624
4.5	number of individuals per worker	3.6	4.6
People out of poverty			
from all workers			
158,282	number of individuals	50,741	107,541
0.5	number of individuals per worker	1.0	0.4
from workers already in the textile and apparel industry			
35,043	number of individuals	5,484	29,559
0.3	number of individuals per worker	0.2	0.3
from workers not already in the textile and apparel industry			
123,239	number of individuals	45,257	77,982
0.7	number of individuals per worker	2.4	0.5

Table A1
Wage Gap Decomposition

Gross Wage differential 1999	Variables	Explained	Not Explained	Selectivity
51%	All	14.4%	58.5%	27.1%
Variables Decomposition	Education	0.0771	-0.5112	
	Experience	0.0639	0.5650	
	Urban Antananarivo	0.0022	-0.3054	
	Constant		3.0263	

Gross Wage differential 1997	Variables	Explained	Not Explained	Selectivity
31%	All	26.9%	68.9%	4.3%
Variables Decomposition	Education	0.0491	-0.3268	
	Experience	0.0543	-0.0407	
	Urban Antananarivo	0.0060	-0.0265	
	Constant		1.3596	

Table A2
Gender wage gap, OLS results of earning equations.

Survey Linear Regression (male workers 1999)

Variable	*Coefficient*	*T-Stat*
Education	0.060***	(2.81)
Experience	0.021***	(4.27)
Antananarivo	-0.205	(1.51)
Mills Ratios	0.096	(1.59)
Constant	11.840***	(34.59)
Number of observations	1369	
Adjusted R squared	0.37	

Survey Linear Regression (male workers 1997)

Variable	*Coefficient*	*T-Stat*
Education	0.133***	(2.77)
Experience	-0.022	(1.31)
Antananarivo	0.12	(0.19)
Mills Ratios	0.524***	(3.27)
Constant	14.111***	(11.12)
Number of observations	66	
Adjusted R squared	0.084	

Survey Linear Regression (female workers 1999)

Variable	*Coefficient*	*T-Stat*
Education	0.167**	(2.46)
Experience	-0.003	(0.23)
Antananarivo	0.883***	(2.85)
Mills Ratios	-0.72	(1.07)
Constant	8.814***	(5.18)
Number of observations	2782	
Adjusted R squared	0.241	

Survey Linear Regression (female workers 1997)

Variable	*Coefficient*	*T-Stat*
Education	0.086*	(1.87)
Experience	-0.02	(1.56)
Antananarivo	0.188	(0.58)
Mills Ratios	0.057	(0.22)
Constant	12.752***	(14.90)
Number of observations	103	
Adjusted R squared	0.0467	

Note: Absolute values of t-statistics are shown in brackets.
Significance levels of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Variables Definition:
logwage= ln(wage) (dependent)
Education = Education in years
Experience = age - years of schooling
Antananarivo =1 if regional code is urban Antananarivo

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